



## **Hood Canal Dissolved Oxygen Program Monthly Update** **May – June 2005**

### **Next HCDOP meeting**

- *When/where*
  - **July 7, 9:30 a.m. to 12:30 p.m., at PSAT office in Olympia.**
- *Proposed agenda items for the next meeting*
  - Brown and Caldwell aeration study
  - Communication strategy

### **HCDOP Coordinating Group Action Items**

- Anne, Jan, Dan and Duane will meet to discuss an HCDOP communications strategy. They will bring recommendations to the next coordinating group meeting. (Done –meeting took place June 9. Will discuss ideas at next meeting).
- Anne will get more information about working with EPA/Environmental Finance Center.

### **Scientific Studies**

- *Project update*
  - The UW Applied Physics Lab deployed an autonomous underwater sea-glider in Dabob Bay and Hood Canal on 6-15 June as part of a demonstration project on the utility of sea-gliders for collecting environmental data. The glider performed 180 dives, covering 75 horizontal km, and used only 20% of its battery power. This technology will be further evaluated for the IAM study. (Newton, UW/Hannafious, HCSEG)
  - Jan Newton gave a presentation to the Puget Sound Nearshore Ecosystem Restoration Project regarding HCDOP-IAM study and possible synergies with that program to the PSNERP Science Team monthly meeting at the Skokomish Tribal Center on 17 June. (Newton, UW/Hannafious, HCSEG)
  - The Skokomish Tribe is transitioning into the freshwater sampling on the west shore and south shore streams (21 total)... June was their first solo sampling days. They are collecting water samples and measuring water flows. Thanks to Lalena Amiotte and her support staff for this effort. (Newton, UW/Hannafious, HCSEG)
  - The Skokomish Tribe has also been sampling the marine water stations. They've been out with the HCSEG weekly monitoring effort for three weeks and additionally provided a Skokomish Natural Resource boat for sampling during the third week of June. Thanks to Lalena and Frank Cousins. (Newton, UW/Hannafious, HCSEG)
  - I would like to give kudos to Suzanne Osborne (working with Jeff Richey) on her efforts to help coordinate the logistics for the freshwater sampling field crews and the UW lab. (Hannafious, HCSEG)

- Mindy Roberts (Ecology) completed the initial draft of the umbrella project plan (QAPP), including all aspects of monitoring and modeling proposed for the first year of the project. The report was sent to Jan Newton, Dan Hannafious, Bob Cusimano, Dave Garland, Kim McKee, Karol Erickson and Will Kendra for comment. A few sections are missing key information. Once the initial review has been completed, the draft will be circulated to the overall project team for comment. (Newton, UW/Hannafious, HCSEG)
- USGS Ground-Water Study - Groundwater seepage data was collected at three sites (Twanoh State Park, Sunset Beach, and Landon Road on the north shore) from July 11-22 by a team lead by Bill Simonds. (Turney, USGS)
- USGS Marine Model – A three-dimensional tidal circulation model (UnTRIM) has been constructed to simulate the circulation of Hood Canal. The USGS modeling team plans to meet with the UW modeling team later in July to compare results. (Turney, USGS).
- USGS Initial Nutrient Input Assessments - A draft USGS report describing the preliminary assessment of loadings of aqueous inorganic nitrogen to Hood Canal and Lynch Cove has been prepared and is presently undergoing the first level of internal USGS review. A revised draft will be available for colleague review at the beginning of August; this review is being coordinated with the HCDOP-IAM group. (Turney, USGS).
- A second USGS report describing the currents off Union and Sisters Point, as determined from the ADCP data collected last fall, is also undergoing the first level of internal USGS review and should be ready for colleague review within a month or so. (Turney, USGS).
- A third USGS report documenting the results of the surface water sampling in the Skokomish, Tahuya, and Union Rivers last fall is being drafted this summer. (Turney, USGS).
- USGS Fish Disease Study - A survey of wild fishes in Hood Canal for *Ichthyophonus*, a highly pathogenic protozoan parasite of marine fishes, is nearing completion and preliminary data indicate high prevalence of infection in some species. (Turney, USGS).
- *New information generated by projects*
  - The UW PRISM project will conduct its semi-annual cruise in greater Puget Sound on 28 June – 1 July. This cruise will include a transect in Hood Canal from which an updated oxygen inventory will be calculated. Participating from HCDOP will be Dan Hannafious (HCSEG), Mitsuhiro Kawase (UW), Jan Newton (UW), Lynn Schneider (Ecology) Mark Warner (UW), and a Skokomish Tribal member. (Newton, UW/Hannafious, HCSEG)

### **Corrective Actions**

- *Project update*
  - Water Quality Program staff are continuing to follow discussions on preliminary delineation criteria for a potential sewer service area along the north shore of Hood Canal near Belfair. Determining the service area is critical for determining

- whether it is more cost effective to build a new reclaimed water plant in Belfair, or to pump sewage to the North Bay reclaimed water plant. (McKee, Ecology)
- Although the Washington State Department of Health announced a shellfish downgrade for two stations in Annas Bay, the Skokomish River Fecal Coliform Bacteria TMDL already provides the groundwork for the response process. Many TMDL implementation actions have already been put into place and two additional water quality projects (design of Skokomish Tribe wastewater treatment plant; feasibility study for an anaerobic digester), will be important for addressing major bacterial sources between the study area and Annas Bay. (McKee, Ecology).
  - Duane Fagergren met with Keith Dublanica and Lelana Amiotte of the Skokomish Tribe on final report of 2004 chum salmon project, and discussed options for upcoming season's salmon carcass removal project in line with the budget passed for the biennium. (Fagergren, PSAT).
  - Brown and Caldwell have completed their final report: *Review of the Feasibility of Oxygen Addition or Acceleration Upwelling in Hood Canal, Washington*, Contact Anne Criss for a copy [acriss@psat.wa.gov](mailto:acriss@psat.wa.gov) (Criss, PSAT).
  - Held a conference call with local environmental health directors of Mason, Jefferson, and Kitsap Counties to further define onsite sewage system monitoring work that will be done this summer under contract with Jefferson County Health. The local officials are selecting candidate sites with existing systems whose performance will be tested. (Hull, PSAT)
  - Visited the site of the first PSAT/EPA demonstration unit installation for nitrogen reducing technology (Environmental Earth Systems) and observed the construction process. (Hull, PSAT).

### **Outreach**

- *Public education and outreach updates*
  - Water Quality Program staff attended Mason County's June 8 open house in Belfair dealing with North Shore sewer issues. (McKee, Ecology)
  - The University of Washington hosted an informational gathering at Alderbrook on 28 May regarding Hood Canal and climate studies. Jan Newton gave the dinner talk on Hood Canal, the HCDOP, and the IAM study. About 80 people were in attendance. (Newton, UW/Hannafious, HCSEG)
  - The UW-APL Sea-glider deployed in Hood Canal was presented at the AUV-Fest in Keyport, WA on 15-16 June. Jan Newton presented the data and answered questions regarding HCDOP. Numerous participants from the Navy, NOAA, and federal legislative staff attended. (Newton, UW/Hannafious, HCSEG)
  - On June 2, the HCWEN (Hood Canal Watershed Education Network) met and discussed the direction of general Hood Canal education/outreach efforts. There has developed a strong collaboration of state, county and local groups in providing a consistent, shared message across the watershed. The composition of the HCWEN has changed over the last five years, but has become a better coordinated 'voice' of Hood Canal concerns. (Newton, UW/Hannafious, HCSEG)
  - The Hood Canal Watershed Pledge has books and sun-catchers available. Outreach has begun at many community events and books are being distributed.

So far over 85 people have taken home a copy of the book. If you or your agency is able to help with distribution please let Emily Piper know at 360.427.9670 x 396 or by email at [elpiper@wsu.edu](mailto:elpiper@wsu.edu).

- <http://groups.yahoo.com/group/HCWEN/> is the internal website for members of HCWEN. If you are interested in joining please email Emily Piper at [elpiper@wsu.edu](mailto:elpiper@wsu.edu). You do need to register in order to view the site but there is some great information on there including a calendar of upcoming events, download-able documents and links to other sights. Messages to the entire HCWEN Group may also be transmitted through this sight.

- *Upcoming meeting notices/speaking engagements*

- The next Hood Canal Watershed Education Network (HCWEN) meeting will be July 14 at the Kitsap SSWM Annex Conference Room, So. Bremerton from 11am to 2pm. The focus will be on identifying education programs and overall program needs that are closely tied to low do in Hood Canal. Contact Emily Piper for more information: 360.427.9670 x 396 or [elpiper@wsu.edu](mailto:elpiper@wsu.edu).

### **Funding**

- *Funding now available*

- Onsite Enhancement 05-07 Biennium/\$1.3M: Work to be performed by the Department of Health (DOH) includes development of local onsite management program guidance, support for Local Health Jurisdiction (LHJ) onsite management plans, and facilitating improved data management/integration for the 12 Puget Sound counties. Environmental health directors have concluded that dividing the pass-through money evenly among the 12 counties works best for the first biennium. Key deliverables: Local Management Program Guidance (July 1, 2006); Onsite LHJ Plans (July 1, 2007); LHJ/DOH database enhancements; improved long-term onsite management. (Avy, DOH)

### **Legislative or Congressional action or briefings**

- *Legislative contacts/meetings*

- The Washington State House Select Committee on Hood Canal invited Jan Newton and Mike O'Neal (UW) to give presentations at their briefing regarding oxygenation on 8 June in Olympia. Mike's presentation on the geology of the area and the need for updated mapping resulted in attention by HCSEG to fund this effort. (Newton, UW/Hannafious, HCSEG)
- John Dohrmann and Terry Hull served on a discussion panel focused on aeration of marine waters for a House Select Committee on Hood Canal work session. Duane Fagergren, and Anne Criss attended the hearing, which included a presentation by PSAT contractor, Brown and Caldwell, who presented a feasibility study (done in conjunction with Dr. Marc Beutel of WSU) on concepts for oxygenating parts of Hood Canal. (Criss, PSAT).

- *Regulations or policy issues*

- Public Comment and Hearing for Proposed Chapter 246-272A WAC Onsite Sewage Systems: On July 13, 2005 the State Board of Health will consider

- comments on the supplemental proposal for rule revision. The proposed rules can be found at <http://www.doh.wa.gov/ehp/ts/WW/rdc-final-report-draft-rule.pdf> with supplemental changes at <http://www3.doh.wa.gov/policyreview/>. Supplemental changes are being considered for Local Planning, Drainfield Sizes for Sandy Soils, Transfer of Maintenance Records, and Minimum Land Area/Lot Size. The hearing will be held at 1:30 pm., Wednesday, July 13, 2005. The location of the hearing is at the Red Lion Hotel, 2300 Evergreen Park Drive, Olympia, WA 98502. (Avy, DOH).
- Duane Fagergren met with Brad Ack and Jay Watson to discuss the ESHB 2097 legislation, and began drafting the MOU between the PSAT and the HCCC ; a follow-up meeting will be held in early July. (Fagergren, PSAT)
- *Briefings*
    - The week of July 4<sup>th</sup>, the USGS is hosting a group of Congressional Staffers to observe USGS activities in Western Washington and Oregon. On July 7, the group will spend a few hours touring Hood Canal, hearing about the overall Hood Canal problem, USGS activities on the canal, and how those activities fit into the larger HCDOP program. Tentative plans are for the staffers to visit the canal at Twahoh State Park and near the Skokomish Delta. (Turney, USGS).
    - Duane Fagergren met with Mason County Commissioner, Lynda Ring Erickson, on issues of common interest in Mason County and specifically Hood Canal, including the history and relationship of the Action Team and the HCCC. (Fagergren, PSAT).

## **Media**

- *Media contacts or requests*
  - Chris Dunagan contacted several people for the Kitsap Sun article. Jan Newton spoke with Chris at length regarding the IAM study and put him in touch with key IAM investigators. Dan Hannafious took Chris and the photographer out to the ORCA buoy and demonstrated sampling techniques. (Newton, UW/Hannafious, HCSEG)
  - Provided information regarding demonstration projects to a Kitsap Sun reporter for newspaper articles. (Hull, PSAT).
  - Provided information about Hood Canal funding to Daily Journal of Business. (Criss, PSAT).
- *Media coverage*

### **Hood Canal fixes proposed**

The Olympian

June 9, 2005

<http://159.54.227.3/apps/pbcs.dll/article?AID=/20050609/NEWS01/506090328/1006>

### **Septic systems harm Hood Canal**

The Associated Press

June 7, 2005

[http://seattlepi.nwsourc.com/local/227443\\_hoodcanal07.html](http://seattlepi.nwsourc.com/local/227443_hoodcanal07.html)

**Growth without sewers plagues Hood Canal**

The Olympian

June 6, 2005

<http://159.54.227.3/apps/pbcs.dll/article?AID=/20050606/NEWS05/455/1019>

**Hood Canal bills signed**

Kitsap Sun

May 17, 2005

[http://www1.kitsapsun.com/bsun/lo\\_politics/article/0,2403,BSUN\\_19086\\_3783812,00.html](http://www1.kitsapsun.com/bsun/lo_politics/article/0,2403,BSUN_19086_3783812,00.html)

**Puget Sound in declining health**

May 10, 2005

USA Today

[http://www.usatoday.com/news/nation/2005-05-10-puget-sound\\_x.htm](http://www.usatoday.com/news/nation/2005-05-10-puget-sound_x.htm)

**Hood Canal: An unsung getaway just got better**

Sunset Magazine

May 2005

<http://www.sunset.com/sunset/travel/article/0,20633,1045216,00.html>

\*\*\*\*\* FULL PRINTED ARTICLES FOLLOW\*\*\*\*\*

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**Teaming up to Save Hood Canal**

The Kitsap Sun

June 19, 2005

Hood Canal's low-oxygen crisis may have been decades in its creation. If it takes that long to resolve, there will be little marine life left to save.

There have been seasonal low-oxygen levels in Hood Canal since at least the 1950s; the Canal's length, depth, a raised underwater "sill" near its mouth, and a dead-end at Belfair all combine to reduce natural flushing that freshens the water with oxygen, particularly during winter storms. It's been recognized as a largely natural phenomenon, without any serious adverse effects.

Now, for unknown reasons, low-oxygen levels have gone over the edge, killing countless thousands of rockfish and other bottom-dwelling marine creatures. The condition worsens annually. If it's not corrected, Hood Canal could become a "dead sea" for marine life. For more information on Hood Canal's problems and efforts to resolve them, see our special package of stories, beginning on today's front page.

But since the first alarms were raised three years ago, powerful forces have been mobilizing to save the Canal from that fate. More than 30 federal, state, regional and local agencies are working together, millions of dollars in public funds have been committed to the effort.

Potentially, the most promising projects are computer modeling of Hood Canal and its watershed being developed by University of Washington oceanographers. The marine model is being refined from a pre-existing program; the terrestrial one is under development. When complete, they will work together seeking answers to "what if" questions such as:

- How much plankton - linked to the low-oxygen levels - will be produced from a given amount of nitrogen, and what specific effects will that have on oxygen levels in deep water?
- What difference would it make if all the nitrogen-producing septic systems were replaced along Hood Canal, or in specific areas with certain soil types?

- What specific impacts will result from particular wind and tidal combinations during different seasons?
  - What are the impacts of larger numbers of alder trees, which infuse nitrogen into the soil?
- Substantive data from the computer models will begin coming in late this year and in 2006, and it makes sense for government agencies to hold off on speculative large-scale actions until more solid information is available.

Meanwhile, there's still much that can be done.

Last year, the Skokomish Tribe began maintaining a tribal ordinance that prohibits dumping salmon carcasses into Hood Canal, which increases nitrogen. Working with a government grant, they launched a program for private buyers to purchase salmon carcasses, an encouragement for tribal fishermen to honor the regulation. In addition, Mason Conservation District is planning a treatment plant that can turn livestock and food waste and fish carcasses and into commercial fertilizer.

Homeowners in the Canal area can do their part by keeping their septic system in good working order, reducing or eliminating fertilizer use, keeping pet waste away from Hood Canal its tributary streams, and controlling runoff from their properties.

All the specific causes of Hood Canal's low-oxygen crisis are yet to be determined. And if all area residents take the actions mentioned above it won't cure the problem.

But individually, they'll be small steps that help. Collectively, that adds up to a fairly big step - and far better than the alternative.

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### **New Septic Systems Put to Test**

Kitsap Sun

June 19, 2005

By Christopher Dunagan

An experiment to test nitrogen-removing septic systems in southern Hood Canal was launched Monday with the installation of a small treatment device at a home near Twanoh State Park.

Environmental Earth Systems installed a commercial treatment unit designed to fit into an existing septic tank. The unit, called RetroFAST, is manufactured by Bio-Microbics of Shawnee, Kan. It includes a blower that pumps air into one chamber of a septic tank, treating the waste aerobically, according to Ken Moody of Environmental Earth Systems.

The final stage of nitrogen removal occurs when effluent is cycled back through another chamber of the septic tank, where anaerobic bacteria convert nitrate to nitrogen gas.

Moody is looking for two other sites to retrofit under a contract with the Puget Sound Action Team.

Two other companies also contracted with the Action Team to test their systems.

Terry Hull, who is supervising the project for the Action Team, said one of the key questions involves how well these denitrifying systems work in the relatively low-alkaline waters around Hood Canal, since the chemical conversion requires alkaline conditions. All the systems have been approved by the state and are in use in the region.

If it turns out that excess nitrogen is triggering Hood Canal's low-oxygen problems, experts could propose removing nitrogen from effluent or pumping the effluent away from Hood Canal, Hull said. At the moment, the Action Team is not promoting these units unless someone is building a new septic system, expanding an old system or replacing a failing system.



Another system being tested is a Rotating Biological Contactor (RBC) unit by Five Star Environmental of Kingston. The unit uses slowly rotating disks to aerate the waste before final nitrogen removal. Company owner Jim Patterson has selected three adjacent homes on the South Shore of Hood Canal. Each will have its own treatment unit connected to a common drainfield.

The third system is a recirculating gravel filter designed by Toby Tahja-Syrett and installed by B-Line Construction. Effluent is cycled through a sand filter an average of five times. Two homes were chosen on the North Shore of Hood Canal with one near Triton Head at the Mason-Jefferson county line. Work could begin next month, Tahja-Syrett said.

Monitoring on all systems will be done by Jefferson County Health Department.

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### **Other ongoing programs in Hood Canal**

Kitsap Sun  
June 19, 2005

**Salmon carcasses:** The Skokomish Tribe maintains a tribal ordinance that prohibits dumping salmon carcasses in Hood Canal. Like last year, fish buyers are expected to purchase the low-value salmon during this fall's egg harvest. The tribe will operate a composting facility again this year to solve occasional disposal problems.

**Waste digester:** Mason Conservation District is planning an enclosed treatment plant that can take livestock waste, food scraps and fish carcasses and produce a commercial fertilizer. Designs are in progress.

**Hood Canal Watershed Pledge:** If you live in the watershed, you may receive a booklet and pledge to take actions that could be helpful in protecting Hood Canal.

For information, call Emily Piper at Mason County WSU Extension, (360) 275-4467, ext. 396, or e-mail [elpiper@wsu.edu](mailto:elpiper@wsu.edu).

**Hood Canal Shore Stewards:** People who own shoreline or streamside property can learn how to manage their property to protect Hood Canal. Call Cammy Mills at Jefferson County WSU Extension, (360) 379-5610, or e-mail [cammymills@jefferson.wsu.edu](mailto:cammymills@jefferson.wsu.edu).

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### **Saving Hood Canal**

Kitsap Sun  
June 19, 2005  
Christopher Dunagan

Death was conspicuous even before diver Bob Pacunski entered Hood Canal on Oct. 10, 2003.

Thousands of sea creatures, apparently trapped by an upwelling of low-oxygen water, had perished in southern Hood Canal. Others were struggling to survive.

"We were stunned when we got there," said Pacunski, a marine biologist with the Washington Department of Fish and Wildlife. "There were rockfish everywhere just littering the beach. We found a dead wolf eel, lingcod, several dead flatfish."

Pacunski was one of three divers who surveyed the biological destruction at Sund Rocks Marine Conservation Area near Hoodsport. The scene below water was equally stunning. Many of the smaller fish were dead, while decomposing starfish and sea cucumbers drifted about.



Larger rockfish and lingcod had left their bottom habitats and were crowding together within 10 feet of the surface. Crabs were clustered together clinging to rocks. And Hood Canal's famous shrimp, the spot prawn, were at the surface, too, all struggling to survive.

"It was such an eerie thing to see all these animals crammed into this upper layer with nothing down below," Pacunski said. "How could something like this happen so quickly?"

The three divers descended beneath the struggling mass into uncertain darkness. Octopuses, normally protective of their young, had abandoned their rocky nests, Pacunski said. "The egg clusters were still there, but were just covered with fuzz. There was nothing down there but us. All the fish were gone. It was spooky."

Later, the researchers concluded that about a third of the rockfish in that area had been wiped out, along with untold numbers of other creatures.

That fish kill was not the first sign that Hood Canal's ecosystem was unraveling. Previous fish kills along with a persistent decline in oxygen had raised alarms by late 2002.

Since then, more than 30 government and community groups have responded to the crisis, working together to figure out what is happening to Hood Canal while taking actions that seem warranted. State and federal governments have pledged millions of dollars to address the problem before Hood Canal plunges into a death spiral.

The main ingredients

Tracking down the killer of Hood Canal's sea life is a complex ecological investigation. Nitrogen released from hundreds of septic tanks has emerged as a leading suspect. But experts contend that the evidence is far from complete, and many factors may be in play.

Low-oxygen conditions in Hood Canal have been documented since the 1950s, according to Jan Newton, an oceanographer with the University of Washington's Applied Physics Lab. The length of the canal, its depth and a raised "sill" near the Hood Canal bridge all reduce natural flushing that can freshen the water. But something else is happening today, as oxygen levels plunge to record lows and dangerous conditions persist from year to year.

The natural balance may have been disrupted by an excess growth of tiny, drifting plants called phytoplankton, said Newton. Phytoplankton are a critical part of the food chain, and they produce life-giving oxygen when fed the proper nutrients with sunlight. But these same conditions can trigger plankton "blooms" so dense they can block out sunlight near the surface.

Research has shown that Hood Canal's phytoplankton are encouraged by nitrogen, a nutrient that comes from human and animal waste, fertilizers, some plants and sea water coming in from the ocean.

Also living in Hood Canal are natural bacteria that clean up the waterway by consuming dead sea life. But most bacteria need oxygen to break down organic matter - including dead plankton - and they keep on working even after the oxygen is nearly gone and sea life starts to die.

Other factors that affect oxygen levels:

- Winds and tides, which mix oxygen into surface water and create circulation patterns.

- Rivers that deliver oxygen, nitrogen and organic material and form a layer of freshwater that inhibits mixing.

- Ocean seawater, with its own chemical properties, that flows in at the bottom of Hood Canal.

- Weather and climate changes, which affect most of the above.

Making sense of it Newton and other researchers are working to complete an unusually complex puzzle with pieces that are constantly changing. Thank goodness for high-speed computers.

Mitsuhiro Kawase, a UW oceanographer, is refining a computer model originally developed to predict tides and currents for the entire Puget Sound area. Hood Canal has been divided into a three-dimensional grid that's 100 squares by 600 squares laid out across the surface, with depth represented by additional grids going down into the water. Using mathematical formulations, each of these cubic "cells" adjust individually to changing conditions. Cells influence adjacent cells and contribute to a dynamic picture of the waterway.

The marine model is being set up to account for currents, temperature, salinity and other factors in conjunction with wind, solar radiation and other forces. By the end of this year, when the model is adjusted for known physical conditions, it can be used to answer questions, such as: How much will the water current increase when you add more wind?

The magic of the marine model will be seen when biological factors are applied: How much plankton will be produced from a given amount of nitrogen, and how will that affect oxygen levels in deep water?

As the model is perfected, it may be able to predict fish kills. For example, a wind out of the south tends to push surface waters to the north. This can create a problem at the south end of Hood Canal, where displaced surface water must be replaced by low-oxygen water from the depths. If a weather report predicts southerly winds, the model may be able to calculate whether deadly waters will rise to the surface.

Figuring out how much fresh water and nitrogen come into Hood Canal is the job of a second model being developed by another UW oceanographer, Jeff Richie. This terrestrial model will show the location of homes, roads and forests as well as soil types to predict the flow of nutrients through surface and shallow groundwater.

One intriguing question involves the large number of alder trees growing in the watershed compared to the pre-settlement period. Alders are known to infuse nitrogen into the soil. The model may explain how Hood Canal worked in prehistoric times and calculate whether alders are a factor today.

Outputs from the terrestrial model will feed into the marine model for answers to the most important questions, such as: Will it make much difference if you take out all the septic systems in the Hood Canal region? What if you focus on systems closest to the water or in an area with a certain type of soil? How important are the rivers and incoming ocean waters to the delicate balance of Hood Canal?

"The model isn't some magical black box," Richie noted. "It is just a computer way of summarizing everything you know and linking it together."

Using real information

The models are only as good as the information used to build them, Newton says. That's why much of the \$1.4 million for the first year of work is reserved for data collection. Thanks to an existing UW program, the modeling is being done for \$70,000.

A permanent monitoring buoy has been installed in Lynch Cove to record dissolved oxygen, plankton growth and other conditions. Two similar buoys will be installed next month; one near Sund Rocks and one at the entrance to Hood Canal. Two others will come later. A different type of buoy at Sund Rocks is measuring currents.

Volunteers continue to take weekly samples throughout Hood Canal, and various experts are testing for nitrogen in rivers and streams.

"I'd like to stress that there is a tremendous amount of collaboration between the monitoring data and the modeling," Newton said. "Academics, local governments, NGOs (non-government organizations), tribes and federal agencies, all working together and leveraging an enormous amount of capability."

Keith Grellner of Kitsap County Health District coordinated a study that sampled seeps and tiny streams along the Kitsap County shoreline. He's still pondering the preliminary results, which showed relatively low levels of nitrogen with little or no relation to bacterial pollution.

Nitrogen may reach Hood Canal through deeper groundwater discharges, which is something experts from the U.S. Geological Survey are trying to resolve by sampling special wells at the edges of Hood Canal.

Meanwhile, scuba divers are trying keep an eye on the sea life, so behavioral changes can be factored into the discussion.

Pacunski had been diving for 27 years when he encountered bottom fish swimming at the surface near Hoodsport.

"To be swimming in the water with dead rockfish on the bottom and others essentially gasping for breath is an unreal event," he said. "You never think you would see something like that ... and the hope is we never have to deal with it again."

A mathematical model may provide answers to an increasing number of mysterious fish kills.

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### **In Our View: A Fjord Under Siege**

Vancouver Columbian  
June 7, 2005

Columbian editorial writers

Logic dictates that the people of Washington state would take the best care of their most beautiful natural areas. In Hood Canal, however, logic disappeared to the dark depths like an anvil.

Even before human polluters arrived, the 60-mile inland waterway along the west side of Puget Sound faced a difficult challenge from nature. Because of its narrow shape and a sill at the northern end, Hood Canal water doesn't churn or replenish itself very well. Add to that predicament the waste oozing from septic tanks on or near shorelines, and we have an ecological dead zone in the making.

Henry Minch, retired geologist who four decades ago helped in the cleanup of Seattle's polluted Lake Washington, was quoted by The Associated Press last week as saying the need to clean up Hood Canal has become especially urgent. Ten years ago, Minch had estimated that 4,500 homes in the lower Hood Canal watershed area would pour 153,000 pounds of nitrogen into the fjord annually, mostly from septic tanks. No one knows precisely how many homes have been built near Hood Canal since then, but we do know the oxygen level has plummeted, threatening numerous species.

The best solution is also the most expensive: Shoreline sewer systems could cost \$100 million, former Mason County Commissioner Wes Johnson has said. But even before focusing on infrastructure, more and better inspection of septic tanks would be a big help. Additionally, closer reviews of managing animal waste and controlling runoff water, plus changes to salmon carcass disposal efforts, would help restore the oxygen level and thus inhibit the growth of algae blooms.

Fortunately, People for Puget Sound, the Puget Sound Action Team and the Hood Canal Coordinating Council are on the move. We just hope it's not too late.